

Customer No.: 31561
Application No.: 10/604,393
Docket No.: 10026-US-PA

In The Specification

[0010] To achieve these and other advantages and in accordance with the purpose of the invention, as embodied and broadly described herein, a multilayer film structure for absorbing electromagnetic wave is provided. The multilayer film structure is composed of a plurality of polymer films and a plurality of permeability films. The polymer films have a multi-film stacking structure and the polymer films are composed of a carbon group compound structure. The permeability films ~~having giant magnetoresistance (GMR)~~ are formed on each surface of the polymer films.

[0015] Accordingly, because of the film structure of the present invention is composed of multilayer of polymer films, and the surface of the polymer film is plated with permeability film, the emitted electromagnetic wave will be cancelled by the permeability film ~~having giant magnetoresistance (GMR)~~. Therefore, the electromagnetic wave in the multilayer polymer films will proceed to refract inside the films, and then the energy of the electromagnetic wave will be totally absorbed finally. In another case, the energy of the electromagnetic wave in the multilayer polymer films will be absorbed by the carbon group compound structure and transferred into thermal energy. Moreover, the thickness of the film structure of the present invention can be optimized according to the application on a thin-and-light electronic device.

[0026] Referring to FIG. 1, a multilayer film structure for absorbing electromagnetic wave of the invention including a plurality of polymer films 100 and a plurality of permeability films 104. The material of polymer films 100 includes, but not limited to, polyethylene or another polymers. The polymer films 100 have a multi-film stacking structure and at least one of

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the polymer films 100 is composed of a carbon group compound structure 102. The carbon group compound structure 102 includes, for example but not limited to, a carbon fiber or a carbon containing particle, and the carbon containing particle includes a silicon carbide particle or a nanolevel particle. The permeability films 104 ~~having giant magnetoresistance (GMR)~~ are formed on each surface of the polymer films 100. Therefore, when electromagnetic waves 106a, 106b, 106c and 106d are emitted, the direction of induced magnetic moment of a permeability film 104 above a polymer film 100 is opposite to that of another permeability film 104 below the same polymer film 100. Thus, every neighboring permeability films 104 will have magnetic moments in opposite direction. Finally, except for the reflected electromagnetic wave 106a, all the other emitted electromagnetic waves will be cancelled by the permeability films 104, or be reflected in any one of the polymer films 100 until the energies of the electromagnetic waves are consumed, or be absorbed by the carbon group compound structure 102 and be transferred into thermal energy.

[0037] Accordingly, because of the film structure of the present invention is composed of multilayer of polymer films, and the surface of the polymer film is plated with permeability film, the emitted electromagnetic wave will be cancelled by the permeability film ~~having giant magnetoresistance (GMR)~~. Therefore, the electromagnetic wave in the multilayer polymer films will proceed to refract inside the films, and then the energy of the electromagnetic wave will be totally absorbed finally. In another case, the energy of the electromagnetic wave in the multilayer polymer films will be absorbed by the carbon group compound structure and

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transferred into thermal energy. Moreover, the thickness of the film structure of the present invention can be optimized according to the application on a thin-and-light electronic device.